July 1931

REPORT OF POULTRY RECORD FLOCKS IN MINNESOTA

1928-29 and 1929-30

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DIVISION OF AGRICULTURAL EXTENSION

MINNESOTA MODEL HOUSE USED BY ONE CO-OPERATOR

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The poultry industry in Minnesota is of great importance. Because it is scattered among a large number of farms, one has the impression that it is of minor importance. Yet poultry raising in the state is a $60,000,000 industry.

The value of egg production alone in 1929 was more than $40,000,000. This was more than one-fifth of the value of the milk produced and more than one-fourth of the combined value of all cattle, swine, sheep, and calves sold to packing plants and at stock yards. It ranks ahead of the oats crop and of the potato crop in value.

POULTRY RAISING IN MINNESOTA

The value of the poultry business in Minnesota is placed at more than $60,000,000. Most of the poultry is produced on general farms, a very small part being in commercial flocks of 500 or more. Most recent figures show that the average farm flock numbers about 87 hens.

A survey of 3,311 flocks in 21 counties in different parts of the state, taken over a period of four years, showed an average of 125 hens per flock. The largest farm flocks were in the southern third of the state. A few of the flocks numbered close to 1,500; some of the flocks in the northern counties had as few as 10 hens. Flocks of 300 to 500 were common in southern Minnesota. In the northern part of the state, especially outside of the grain-growing section, flocks of 75 hens were found more often than larger ones.

Surveys bring out weak points in management that need correcting to assure owners a reasonable profit. The hens laid about 50 eggs per hen instead of the 150 that are possible under favorable conditions. That 58 per cent of the flocks were kept in houses that were too small and that only about 35 per cent were receiving a mash may partly explain the low production. Mixed breeds were found in 22 per cent of the flocks—a still further explanation of low egg yield. Only Leghorn flocks exceeded the number of mixed flocks, and only to a small extent. Plymouth Rocks and Rhode Island Reds were next in number.

While a survey gives some indication of how flocks are managed, and of some of the most striking faults, complete records of egg production for the entire year, receipts from the various sources, and the expenses involved in maintaining a flock give more accurate information. It is with this in view that the Minnesota Record Flock Project is conducted.

Purpose of the Project

The primary object in conducting this project is:

1. To assist co-operators in keeping and studying records of their own flocks with a view to making them more profitable.
2. To provide information for flock owners generally as to what may be expected from a farm flock and the various practices that tend to make the flocks more profitable.

The number of flocks enrolled each year is necessarily small but they are scattered in all sections of the state and present sufficient differences in number of birds, breed, cost of feed, price of eggs, and management to furnish valuable information.

This report covers the years 1928-29 and 1929-30. A few of the principal facts about these flocks are as follows:

Table 1

	1928-29	1929-30
Number of flocks reported	51	51
Total number of hens (Based on monthly averages)	10,889	11,229
Average number of hens (Based on monthly averages)	210	220
Number flocks of light breed	31	35
Number flocks of heavy breed	16	12
Average number eggs per hen (Based on monthly average number of hens)	152	147
Average feed cost per hen (Based on monthly average number of hens)	$2.33	$2.16
Percentage of total cash receipts from eggs	69	58
Average price per dozen eggs	$0.33	$0.29
Average price per hundredweight for feed	$2.12	$1.93
Net return per hen (Based on monthly average number of hens)	$2.49	$1.90

As might be expected, flocks differed widely from lowest to highest in eggs laid, prices paid for feed, prices received for eggs, and death loss.

Table 2

Range in Important Factors

	1928-29		1929-30	
	Highest	Lowest	Highest	Lowest
Average number hens	681	32	603	30
Average eggs per hen	245	85	205	71
Price per cwt.—Scratch feed	$2.85	$1.23	$2.55	$0.94
Mash	$3.86	$1.21	$3.31	$1.41
Price per dozen	$0.42	$0.25	$0.40	$0.18
Adult mortality, per cent	44	1	60	0.6
Chick mortality, per cent	51	4	69	0.9
Net return per hen	$5.63	$—0.91	$5.64	$—1.87

Some of this great variation is due to differences in location. Certain sections of the state have a consistently higher price for eggs. Outside of the grain section, feed prices are quite generally higher. Other differences are due to methods of marketing; eggs sold to hatcheries or special consuming markets and poultry dressed for private customers bring a higher price. Other differences may be traced to differences in management, as in the kind of feed used, whether commercial or home-mixed, housing facilities, and other phases of management.

Table 3 gives an idea of the changes in price that have occurred in six years. It also shows how results in the flocks as a whole have averaged during that time.

Table 3
Six Years of Records

	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30
No. of flocks.....	31	29	39	46	51	51
Av. size of flock	196	187	236	247	210	220
Av. production per hen	128	124	137	150	152	147
Price of feed per cwt. .	....	....	$2.45	$2.31	$2.12	$1.93
Price of eggs per doz. .	$0.34	$0.32	$0.27	$0.34	$0.33	$0.29
Av. lb. grain per hen ..	56	58	50	54	52	50
Av. lb. mash per hen ..	32	34	39	56	50	51
Av. net return per hen	$2.53	$2.25	$1.61	$2.54	$2.49	$1.90

Basis for Averages

The average number of hens per flock used is the average of the number of hens in each month of the year. On this basis the average egg production and average net return per hen are more than they would be if figured on the number of hens at the beginning of the year. Culling closely and regularly throughout the year increases the average production per hen, as the production record is based on the best hens in the flock. However, the cost of feed and total expense per hen are correspondingly higher and help to make up for any discrepancy resulting from such a basis for computing average egg production. The percentage mortality loss is based on the number of adult birds on hand at the beginning of the year and of the number of chicks hatched but not sold as chicks.

These facts should be kept in mind in studying the individual flock records and the averages of all flocks to avoid over-estimating the production and return that might be expected from any number of birds with which the year started. To illustrate with the records of 1929-30: Average number of eggs laid on the basis used were 147 per hen. If, however, the flock owners could have figured in advance on the basis of the number of hens they had at the beginning of the year, they would have found that they could count on only 119 eggs for each hen then in the flock. In the same way they would have found that they could feed at a cost of $1.70 for each hen at that time in the flock, whereas the cost amounted to $2.16 per hen for the average hens for the year.

Records Should Answer Questions

Records of this sort should help to answer certain questions that affect the plans to be made in developing any poultry business.

Shall I Choose a Light or a Heavy Breed?

Table 4 gives an idea as to how the two types of flocks compare in net return.

Table 4

Net Return per Hen

	Light breeds		Dual-purpose breeds	
	No. flocks	Return per hen	No. flocks	Return per hen
1925-26	11	$2.11	15	$2.29
1926-27	20	1.79	16	1.66
1927-28	29	2.83	15	1.40
1928-29	31	2.32	16	3.24
1929-30	35	1.94	12	1.95

It is evident that there is no assurance from one year to the next that either light breeds or heavy breeds will lead in returns.

Several factors must be considered to explain the differences.

1. The flocks of the different breeds are not of the same size.

2. Income from meat and from eggs varies considerably in the different flocks. In the dual-purpose flocks, both years, poultry contributed about 50 per cent of the total income; in the Leghorn flocks the income from poultry was only about 25 per cent of all receipts. However, in dual-purpose flocks that have a high egg production there is a greater chance for profit. For example, one of the dual-purpose flocks in the 1928-29 project, with an egg record of 187 eggs per hen, furnished an egg income of $5.32 and a return from meat amounting to $3.27 per hen, a total of $8.59 per hen. The highest Leghorn flock, with a record of 245 eggs per hen, had an income of only $7.22 per hen, of which $6.50 came from eggs and 72 cents from meat. Even with one-fourth less eggs the dual-purpose flock had the advantage. Given the same egg production, and other things being equal, the dual-purpose flocks should always lead in income. In the 1928-29 project, the Leghorns averaged 158 eggs per hen as compared with 133 for the dual-purpose breeds; the following year they averaged 156 and 118 eggs per hen respectively.

3. A further important factor is the amount and cost of feed used. The Leghorns require less feed, about 95 pounds per hen for laying and young stock during each of the two years; the dual-purpose flocks used about 130 pounds per hen. In spite of this great difference in amounts of feed consumed, the feed cost per hen in these dual-purpose flocks was only slightly higher than in the Leghorn flocks because more of the Leghorns were in the northern part of the state where feed costs are considerably higher. In these non-grain-producing sections there is a greater tendency to feed commercial feeds, which increases the cost still further. Feed in the Leghorn flocks cost $2.49 and $2.23 per hundred these two years, while the feed in the dual-purpose flocks cost only $1.83 per hundred. It is probable that if the breeds were divided more equally between the two sections there would be less difference in net return.

The records may be taken to indicate that breed is not of the greatest importance in determining returns.

Is High Egg Yield Necessary?

The records of both years point strongly to the fact that net returns may be expected to increase with an increase in production. Figure 1 shows how the net return rises with a higher egg production, and also that a high winter egg yield is essential to a high annual average. This is contrary to a rather common belief that it is possible for a flock to make up for a small production in winter by an increased production in spring and summer.

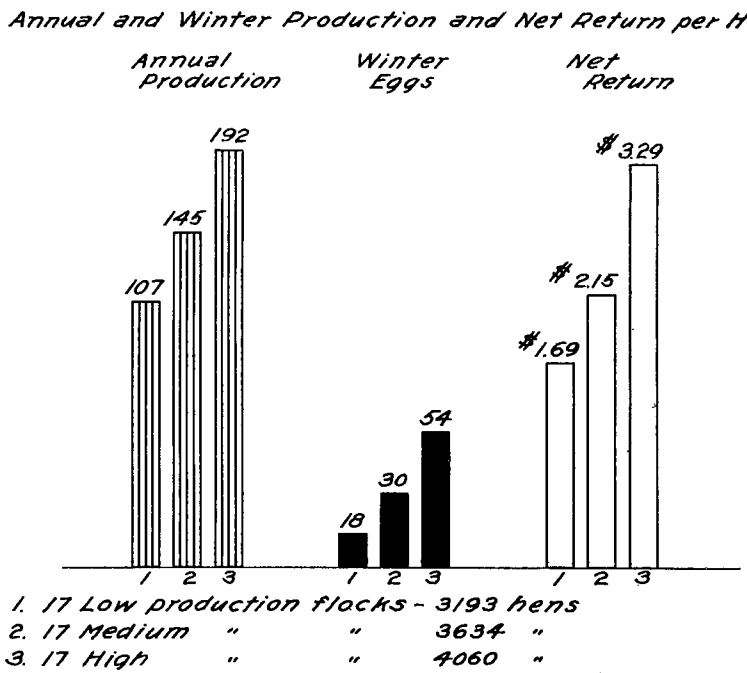

Fig. 1

Within the different groups there is much variation, as shown in Table 5.

While the flocks in these various groups differed in production, they were remarkably consistent in winter production as compared with annual production. For example, of the 17 high-producing flocks in 1928-29, 16 averaged 40 or more eggs per hen from November to February; while in the low-producing group no flock averaged 40 winter eggs per hen, in fact, all but one flock averaged 30 or less eggs per hen.

Table 5

Eggs per Hen

	Annual production		November–February production	
	1928-29	1929-30	1928-29	1929-30
	High-Producing Flocks			
High flock	245	205	78	72
Low flock	166	155	26	38
Average	192	181	54	48
	Medium-Producing Flocks			
High flock	164	154	47	38
Low flock	133	121	20	30
Average	145	140	30	32
	Low-Producing Flocks			
High flock	128	119	34	11
Low flock	85	71	8	9
Average	107	103	18	19

A high egg yield was consistently accompanied by a high return. Profits were lower in 1929-30 than in the previous year, but in both years a fair profit was made in all the flocks having an egg yield above average. In the flocks with below average production, the returns were lower and in some cases represented an actual loss. In the 1929 project, the only two flocks showing a loss were in the low-producing group whose egg yield averaged 107 eggs per hen.

As might be expected, the price per dozen received for eggs was larger in the flocks laying more eggs. Table 6 illustrates this.

Table 6

Egg Yield and Price per Dozen

Flocks	Year	Eggs per hen	Price per dozen
High-producing	1928-29	192	$0.34
	1929-30	181	0.30
Medium-producing	1928-29	145	0.33
	1929-30	140	0.28
Low-producing	1928-29	107	0.30
	1929-30	103	0.26

Winter egg production was important, but was not the only cause of the higher price per dozen. In some flocks the sale of eggs for hatching purposes raised the average price. In certain sections of northern Minnesota and near the Twin Cities poultrymen had a decided advantage in price of market eggs the year round. One co-operator who received an average of 42 cents per dozen for the year 1928-29 and 40 cents the following year benefited in three ways: (1) high production (about 175 eggs per hen, 55 winter eggs per hen), (2) sale of hatching eggs, and (3) nearness to an all-year good market.

Culling

Culling closely at all times is considered important to good management. Non-producers, especially at certain times of the year, are likely to take so long a vacation as to eat up any profits to be received after they begin laying again. However, there is a question as to the efficiency of culling heavily during the first half of the year. If the flock is sorted as carefully as possible before being housed in the fall, the lowest producers will have been eliminated, thus saving feed.

Bearing out this theory, in the 1928-29 project the low-producing flocks were culled more heavily the first six months than were the medium- or high-producing flocks. This did not occur in the 1929-30 project, but there was still a noticeable tendency among the low-producing flocks to have a high percentage culled out early in the year. Nine of the 15 low-producing flocks lost 25 per cent or more of the original hens by culling by the end of the first six months; in the 17 high-record flocks only one flock was culled so drastically.

Log houses are sometimes used with good results

Culling the last half of each year was heaviest in the heavy-laying flocks, less heavy in the medium-producing flocks, and least in the low-laying flocks. This indicates that good management includes watchfulness to eliminate the low producers as they appear, but that greatest care should be taken to avoid housing pullets that will not prove profitable layers.

Does High Production Cause High Death Rate?

It is commonly believed that a heavy laying flock must suffer greater death losses than a low-laying flock. Total losses from all causes varied little in the two years covered by this report. Losses in adults in 1928-29 amounted to 12 per cent of birds on hand at the beginning of the year. The following year this was increased to 13 per cent.

Chick mortality was 24 per cent of all chicks hatched the first year and 23 per cent the second year.

Grouping the flocks as to production, both years the loss of mature stock showed only a slight difference between the lowest and the highest groups, as Table 7 indicates.

Table 7

Production and Death Loss

	1928-29			1929-30		
	Average eggs per hen	Loss percentage		Average eggs per hen	Loss percentage	
		Hens	Chicks		Hens	Chicks
High-producing flocks ..	192	10	19	181	11	18
Medium-producing flocks	145	15	21	140	18	19
Low-producing flocks....	107	13	31	103	12	39

Losses in chicks were actually less in the high-producing flocks, a fact which may indicate that the ability to lay well is an evidence of good vitality, and should produce strong chicks as well as many eggs. At least, the record shows that good egg laying is not necessarily accompanied by a heavy death loss in either hens or chicks. If such were the case, the best evidence of it should be found, not in the best producing group so much as in the few best flocks whose records run considerably above the average. Table 8 shows the standings of the highest and the lowest flocks in this respect both years:

Table 8

Mortality—High- and Low-Producing Flocks

	Four highest flocks			Four lowest flocks		
	Annual eggs per hen	Mortality, per cent		Annual eggs per hen	Mortality, per cent	
		Hens	Chicks		Hens	Chicks
1928-29	245	9	20	85	14	47
	218	9	43	94	12	27
	214	15	No chicks	97	13	36
	201	10	26	99	12	5
1929-30	205	8	20	71	7	19
	201	6	7	79	11	52
	190	7	8	86	0.6	6
	188	9	14	88	9	46

Judging from these flocks there seems no reason to believe that death loss is increased with egg production. Good management may be expected to control death losses as well as egg production.

Production and Feed Costs

Does a large egg yield cost more than a small yield and, if so, how much? If it does cost more, is it justified by the increased returns? Separate figures for cost of feeding hens and of growing the young stock are not available for most flocks. However, from the informa-

tion given for a few flocks, it was estimated that the feed consumption was about 70 to 75 pounds per hen. The feed requirement for the young stock would then amount to about 30 pounds of feed for each pullet raised. In order to consider the entire feed cost of maintaining and replacing a flock, all feed costs were charged against the hens.

Records for the two years indicate that as the number of eggs laid increased there was a definite increase in both feed cost and total expense. Feed cost per hen increased slightly more than total expense.

It will be seen in Table 9 that the total expense in 1928-29 was a little less in the medium-producing flocks than in those producing the fewest eggs. This indicates that altho high production is secured at a greater cost, the expense of maintaining a flock even with poor production can seldom be reduced beyond a certain point.

Table 9

Eggs, Feed Cost, and Expense

	Eggs per hen	Feed cost per hen	Total expense per hen
	1928-29		
17 low-producing flocks	107	$2.11	$3.66
17 medium-producing flocks	145	2.19	3.53
17 high-producing flocks	192	2.64	4.20
	1929-30		
15 low-producing flocks	103	1.85	3.20
18 medium-producing flocks	140	1.99	3.48
18 high-producing flocks	181	2.53	4.46

Deducting the feed cost from the total cost, expenses other than for feed were $1.55, $1.34, and $1.56 per hen in the low-, medium-, and high-producing flocks in 1928-29, and $1.35, $1.49, and $1.93 respectively the next year. The differences are so slight as to lead to the conclusion that feed cost is the chief factor in variations in costs.

Table 10 shows that an increased outlay for better care was justified by the returns.

Table 10

Added Expense Brought Returns
Increase from Lowest to Highest Flocks

	1928-29	1929-30
Feed cost, per cent	25	36
Total expense, per cent	14	39
Net return per hen, per cent	94	149

In other words, increased investment to provide better feed and care can be made to pay in increased egg production and sale of poultry.

Feed Cost per Dozen Eggs

Another measure of the benefits to be derived from better management is the feed cost per dozen eggs. In 1928-29 this varied from 17 cents per dozen in the high-producing flocks to 24 cents per dozen in

the low-producing flocks. In the second year the feed cost per dozen was 14 cents in the highest flocks and 18 cents in the lowest. When it is remembered that in both years the eggs from the high-producing flocks brought 4 cents a dozen more than those from the low-producing flocks, the advantage is even more apparent. In the high-producing flocks in 1928-29, the eggs sold brought 17 cents a dozen over the feed cost; in the low-producing flocks only 6 cents. In 1929-30 the first group made 16 cents a dozen over feed cost and the low-producing flocks 8 cents a dozen.

Sale of Broilers

A practice that is all too common among farm-flock owners is that of retaining the surplus cockerels for sale beyond the broiler stage. It is well known that the price per pound for broilers decreases as the season advances and that the price per pound paid for cockerels decreases as they approach maturity, so that in the fall the mature cockerels bring the lowest price per pound of any grade of market poultry. However, the argument is frequently given that even tho the price per pound is less the increased weight of the birds assures a greater return.

The records for 1928-29 were studied to determine the price received per cockerel during six months, beginning with May. All breeds taken into consideration, the price per bird received was as follows:

Table 11

Price of Cockerels by Months, Cents

May	52
June	55
July	55
August	59
September	58
October	76

No accurate data on feed costs of producing broilers are available, as the feed for chicks was not reported separately from that for hens. However, the figures as to average amounts of feed required to grow a chick show that after it has reached the broiler stage feed is required for the succeeding months as shown in Table 12.

Table 12

Feed Cost of Holding Broilers

Months after broiler stage	Pounds feed per chick	Value extra feed needed, cents
1st	4	9
2d	5½	12
3d	7	15
4th	7	15
5th	7	15

Figure 2 brings out the fact that holding cockerels beyond the broiler stage resulted in an actual loss each month, amounting to 40 cents per bird on cockerels ready for sale as broilers in May but held for October sale.

Figure 3 shows that there was a similar though smaller loss on cockerels ready for July sale but held from one to three months.

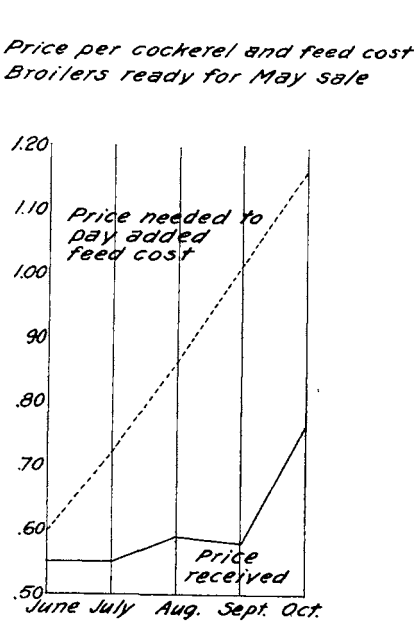

Fig. 2

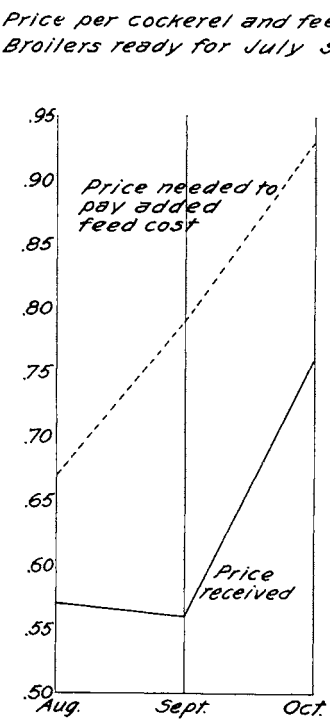

Fig. 3

The records were studied further to see if this applied to Leghorn and dual-purpose cockerels alike. It was found that the loss resulting from holding beyond the broiler stage was greater in the case of Leghorns and that the holding of dual-purpose cockerels for one month brought a profit of 18 cents per cockerel. Sale two months after broiler stage in the dual-purpose breeds brought a gain of only 9 cents per cockerel. In neither case does this take into account the added labor or the fact that disposal of the cockerels would, in most cases, mean better conditions for the pullets. Holding dual-purpose cockerels for one month was perhaps justified. After two months an actual loss occurred.

These figures lead to the conclusion that, in practically all cases, cockerels should be considered a by-product that should be disposed of at the earliest possible time.

There is even a decided question as to the advisability of retaining any except a few outstanding breeding cockerels for sale unless a sufficiently high price is assured.

Monthly Production

One of the main purposes of records should be to serve as a measure of success under varying conditions. Records of egg production by months show what may be expected and where there is need for improvement. Comparison of returns in different flocks or in any one flock under different conditions furnishes reliable information by means of which the management may be improved. Table 12 gives a standard of monthly production based on an average of 130 eggs per hen for the year. It also shows for comparison the average production in all the flocks by months and the monthly average eggs laid per hen in a few individual flocks.

Table 12

Monthly Analysis of Egg Production, 1928-29

Months	130-Egg standard	Eggs per hen				
		Average, all flocks	Light breeds		Dual-purpose breeds	
			High-producing flock	Low-producing flock	High-producing flock	Low-producing flock
November .	4.0	6.2	21.2	8.4	11.4	0.9
December ..	6.5	8.4	14.2	6.9	6.3	1.8
January ...	8.5	9.3	19.9	6.9	9.2	4.6
February ..	11.0	9.8	21.5	4.4	10.5	5.2
March	16.0	15.0	24.4	6.8	15.9	11.9
April	17.5	19.4	23.9	15.4	23.4	18.3
May	16.0	18.6	24.2	9.3	22.5	14.6
June	13.5	16.4	22.5	10.3	25.2	11.7
July	12.5	15.6	21.8	7.6	17.2	11.4
August	12.5	14.3	20.6	10.2	16.6	8.6
September .	8.5	9.8	15.6	3.8	14.5	3.9
October	3.5	6.0	14.2	0.3	9.7	1.1
Total ...	130.0	152.0	245.0	94.0	187.0	85.0
Feed cost per hen ...		$2.33	$2.91	$2.16	$1.96	$3.52
Net return per hen...		2.49	2.46	—0.02	5.63	2.37
Flock number		....	1	2	3	4

The table points definitely to the need for good production in Leghorn flocks, as eggs furnish so large a percentage of the income in those flocks; in the dual-purpose flock the income from meat may be sufficient to more than make up for any shortage in eggs. It should be explained further that the low-producing dual-purpose flock owes its noticeably good net return to the sale of breeding stock, hatching eggs, and baby chicks.

It is worth noting that good annual records are made by consistent production throughout the year. Figure 4 shows graphically that the high-producing flock was above the average of all flocks during every month. Likewise the low-producing flock was at all times of the year below the average in production. The 1929-30 records show essentially the same condition, emphasizing still further that the flock or hen that lays steadily throughout the year makes the high annual average, and that neither flocks nor hens are likely to make up in the spring for time lost during the winter.

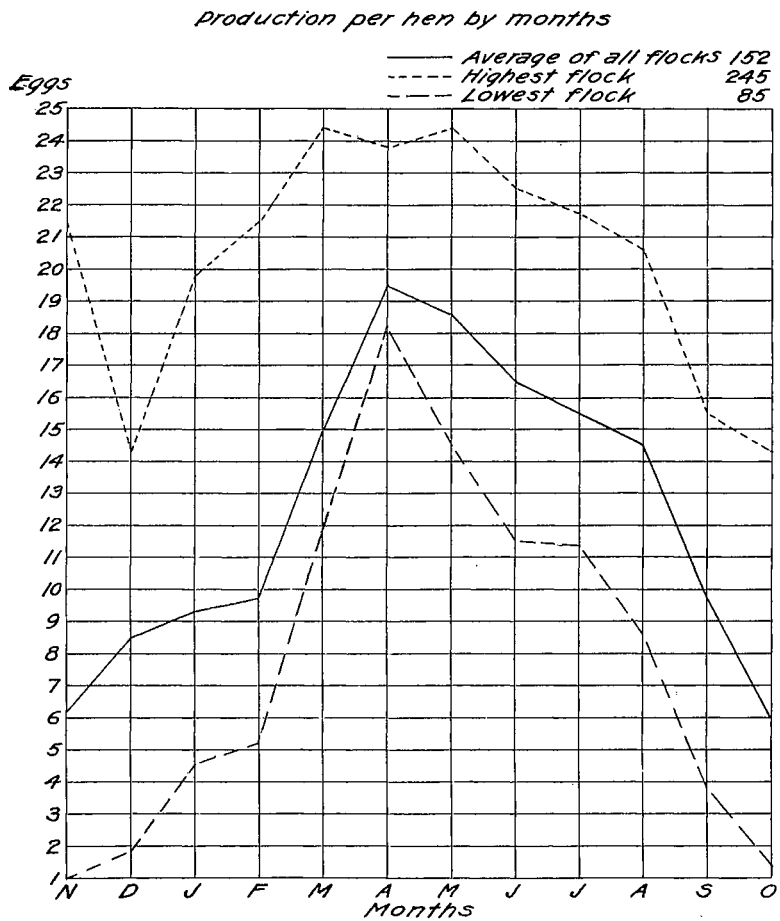

Fig. 4

These flocks can be used as a basis for comparing methods to show how factors other than feed cost affect returns. Flocks 1 and 2 are the high- and low-producing Leghorn flocks; flocks 3 and 4 are the high- and low-producing dual-purpose flocks.

Flock 1 produced more eggs than any other and yet the profit was less than half that of Flock 3 and slightly more than one-third its production.

Table 14

Factors Affecting Returns, per Hen Basis

	No. of eggs	Expense other than feed	Return from eggs	Return from poultry	Net return
Flock 1	181	$1.93	$6.57	$0.72	$2.46
Flock 2	94	1.37	2.96	0.55	0.02
Flock 3	187	1.10	5.31	3.38	5.63
Flock 4	85	3.43	1.73	4.02	2.37

Flock 3, consisting of Wyandottes, showed good management. It had several advantages, one of them being its low housing cost. The flock was kept in a corner of the barn, which had been made into very comfortable quarters of the straw-loft type at practically no expense. The hens were well fed on a home-mixed ration. Care was regular. Culls were weeded out as they appeared. Forty-seven hens were culled out in June and 19 more in September. A particular advantage was found in the sale of 946 dozen hatching eggs, or almost half the year's production at an average price of 38 cents a dozen. This brought the year's average price to 34 cents per dozen. By dressing and selling the broilers to private customers, the owner received $1.01 each for cockerels sold from June through October. This income amounted to nearly half of the $400 received from poultry sales. One hundred chicks killed by rats early in the summer constituted the only loss. Good feed and care, plus good management in the sale of products, made for an unusually high net return.

Flock 1, the high-laying Leghorn flock, made a record that can seldom be duplicated. This was possible because of the excellent conditions provided. The flock consisted of well matured April pullets purchased as chicks from a breeder of high-producing stock and raised on clean ground. A well balanced ration for chicks and hens, fed regularly and with variations to suit the condition of the flock, made for rapid growth and steady laying. Artificial lighting brought 76 eggs per hen from November to February, inclusive. From December to May a moist mash was fed at noon. A well constructed, clean, bright house kept the hens comfortable. Sale of hatching eggs at 37.6 cents per dozen from February through June helped to increase the income.

However, the expense of maintaining the flock was high. Commercial ventilation and equipment was used in the house, which was heated and lighted in winter. Commercial mash was fed as well as some commercial scratch feed. This brought the price of feed to $2.53 per hundred, or 41 cents above the average, and the feed

cost to 60 cents per hen above the average for all flocks. In other words, more money might have been made had it not been for the high costs.

Flock owners should give attention to the fact that Flock 3, with about one-third as many hens, made more than twice as much per hen as Flock 1 and only a little less total net return. It is often most profitable to keep a flock of such size that the work can be done with-

In this old house, well cared for, pullets averaged over 200 eggs each

out the need of high-priced feeds and equipment as a means of saving labor.

Flock 2 laid few eggs and, as a result, being Leghorns, their return was written in red. The ration showed a good balance between scratch feed and mash but was restricted in amount. Winter production was only 27 eggs per hen, caused largely by a house that was cold and poorly ventilated. Eggs brought 36 cents a dozen on the local market but were too few to insure a profit for the year.

Flock 4 was a dual-purpose flock with a low egg yield but a reasonably large return. The owner expressed the belief that the low

production might have been caused chiefly by a crowded condition in the house. The ration contained too much scratch feed, which is more serious with a dual-purpose breed than in a Leghorn flock and was probably a big factor in the low egg yield.

The relatively high return from this flock resulted partly from the sale of hatching eggs and of broilers at a premium. Principally, however, it came from the large number of pullets raised as compared with the other flocks. In Flock 4 the pullets reared were one and one-half times the average number of hens kept. This increased the feed cost and other expenses but also increased the inventory value of the flock at the end of the year to the extent of $460. Further explanation of the heavy expense lies in the fact that the house was enlarged and improved. Feed costs were reduced by use of home mixtures. It is

This commercially ventilated house gave good results though at greater cost

significant of the possible returns from poultry, that this flock averaging 263 hens paid for its feed, housing, and interest on the investment, and in addition produced over $600 for improvement and increase of buildings and equipment and for an increase of 76 per cent in the size of the flock on hand at the end of the year.

Sectional Differences

It is frequently claimed that farm flocks are profitable only in sections where grain is cheap and much feed can be picked up on range. The 1929-30 records give strong evidence that this is not the case. The flocks were divided into two groups as to location in or out of the grain-producing area. The flocks in the section of the state where little grain is grown had a higher feed price per hundred

and a higher cost per hen. The average price paid in the grain area was $1.58 and in the non-grain section $2.35 per hundred. In spite of this fact the flocks in the non-grain section had a higher net return—$2.15 per hen as compared to $1.68 in the grain section. Several factors helped to secure this advantage. The hens laid 31 eggs per hen more than those in the grain area, their production averaging 164 eggs per hen. Fifteen of the twenty-one flocks whose egg yield was more than 150 eggs per hen were in this area. Winter production was 12 eggs per hen higher, the average for this group being 41 eggs per hen during the first four months of the project year. Egg prices were 5 cents higher, averaging 34 cents a dozen for the year. The higher production may have been partly or wholly due to the fact that there were more Leghorns in that section. Better management was, however, generally noticeable and, since feeds were purchased, there seemed a greater tendency to feed the right type of rations than in sections where home-grown grains were used. Moreover, much of the housing and equipment is newer and more up-to-date than that found in the southern part of the state.

The fact that greatest returns were made in the section where feeds must be purchased might be taken as an indication that feeding of commercial mixtures is economical but the largest returns were made in the flocks which were fed home-mixed feeds. Seven flocks with a return of over $2.00 per hen received home-mixed rations; only one flock on a commercial ration made that much. All three of the flocks in this group whose return represented a loss had commercial feeds. The flock that had the highest production in this group, 201 eggs per hen, made only 60 cents net return per hen in spite of a very low death loss and with an egg price only 3 cents below the average price per dozen. Commercial feed at $2.92 per hundred made a profit almost impossible.

A study of the records leads to the conclusion that poultry raising is a source of substantial income even in sections where feeds are expensive; also that it is economical to purchase such feeds as are necessary to supplement the home-grown feeds in a well balanced ration.

A comparison of three flocks will show some difference in costs and in returns from various sources.

The low-producing flock failed to give an increased income even with a low feed cost. The conclusion may be drawn that the feed was inadequate for good laying. The third flock shows an advantage in the production of baby chicks for sale. The first and third flocks emphasize the importance of good egg production.

A loss of nearly $2.00 per hen is not surprising in one flock in which the death loss amounted to 60 per cent of the adults and 56 per cent of the chicks hatched.

Table 15

Comparison of Flocks as to Size, Production, Sources of Income, and Expense Per Hen Basis

	A high-producing flock	A low-producing flock	A flock selling chicks
Hens and pullets, Nov. 1, 1929	195	264	768
Average number hens	201	233	493
Average eggs per hen	205	71	172
Expenses			
Feed	$2.37	$0.97	$2.94
Interest, use of buildings, and equipment	0.84	0.38	1.04
Miscellaneous	0.41	0.08	4.09
Total expense	3.62	1.43	8.07
Receipts			
Eggs	4.49	1.36	5.46
Poultry	1.88	0.37	1.15
Chicks	0.48	....	5.05
Miscellaneous	....	....	0.42
Total receipts	6.85	1.73	12.08
Return for labor	3.23	0.67	4.01

Further flocks might be cited to show other management practices that increase or decrease income.

One co-operator with a production of 144 eggs per hen in 1929 increased it to 178 eggs per hen in 1930, principally by means of increasing the feed space. Discarding two feeders costing $33, he replaced them with six home-made trough feeders costing $1.50 each, a total of $9.00, thereby supplying ten feet of feeder opening per 100 hens—60 feet in all—instead of 16 feet which he had used formerly.

Flock owners with high records and good returns reported the use of standard rations and well ventilated houses as principal means of securing these results. Cod liver oil for laying hens during the winter was used almost without exception in the flocks with a good egg yield.

Summary

These flocks serve to illustrate the principal elements of good management, the adoption of which may be expected to increase returns.

1. Home-mixed feeds on all farms and home-grown feeds in the grain producing sections.
2. Low death loss in hens and chicks.
3. Regular care and feeding.
4. Emphasis on high winter and annual egg production.
5. Sale of hatching eggs at a premium price.
6. Sale of surplus poultry to private customers.
7. Economy in cost of buildings and equipment.

In addition to these factors the quality of the stock is important, tho less tangible. Flock owners need definite programs for improvement of their flocks through breeding, which will bring its results.